Synopsis

Ph.D. in Education

EFFECTIVENESS OF EXPERIENTIAL PEDAGOGY ON SCIENCE PROCESS SKILLS, SCIENTIFIC ATTITUDE AND ACHIEVEMENT IN SCIENCE OF SECONDARY SCHOOL TRIBAL STUDENTS IN KERALA

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INTRODUCTION

Educational system in and around the world are highly under pressure to apply and enable the new technologies to enhance the student achievement and progress. The technologies that are needed to master the teaching skills in order to provide good and quality education and training are being increasingly practiced and implemented by the teachers all around the world. The 21st century skills are so powerful that it can literally be used to replace the teacher as a first-hand student scaffold. Many countries in the world are following constructive practices and methods to enhance and improve the status of the teaching learning system.

Kolb (1984) has rightly identified Experiential learning as a specific approach to enhance and arouse creativity and interest in students in the process of learning. The students are learning from the experience that they acquire by themselves in the learning process. The teacher acts as a scaffold who gives certain experiences to the children so that each child is able to relate that experience with the content to be transacted. Thus, the teaching learning process becomes more conducive and easier and the students are more productive in terms of their achievement and activities. Selection of experiences by the teacher plays a very important part in this Experiential Learning. The teacher on dealing with a normal sample can select globally accepted experiences and situations to relate it with the content to be transacted, whereas a teacher who is dealing with a disadvantaged section of the society, needs to be more diligent in choosing apt and relevant experiences that suits the content to be transacted.

Teaching of Science as a subject warrants the use of many such learning experiences. The learning experiences must be age appropriate, relevant, locally known and practiced by the learners themselves. Providing such a locally relevant experience makes the concept learning easier and interesting. The students will be able to find the connection between the experience and the content easily by themselves and hence the learning so made will be permanent and concrete. If the experiences are selected from the local surroundings that are familiar to the learners, then the students will find it easy and interesting to find the new knowledge and can easily comprehend the same. So proper care should be taken in choosing the relevant experiences from the locally available situations, traditions, customs and practices of the locality from where most of the students come. Science is a subject full of

experiments and facts among which most of them are testable and universally accepted. Science education needs the skill of experimenting and observation in order to arouse and instil creativity and interest among the students who learn the subject. By clubbing the activities in science and culture, the teacher can suitably select the relevant experiences associated with the topics to learn and thus make a permanent impression among the learners about the concept.

Science Process Skills include skills that every individual could use in each step of his/her daily life by being scientifically literate and increasing the quality and standard of life by comprehending the nature of science. Therefore, these skills affect the personal, social, and global lives of individuals. American Association for the Advancement of Science (AAAS) classified the Science Process Skills into fifteen (Bybee et al., 1989). These are: observing, measuring, classifying, communicating, predicting, inferring, using numbers, using space/time relationships, questioning, controlling variables, hypothesizing, defining operationally, formulating models, designing experiments and interpreting data.

For children to achieve better in science, they must not only acquire the necessary knowledge, but also understand its value, enjoy the experience of working scientifically, and sustain their interest in learning it. Children in schools need to discover the concepts revealed through observing scientific phenomena and conducting experimental investigations for themselves.

Achievement in Science indicates the cognitive achievement in the science subject that the student has made in a test so constructed to study the level of accuracy that he or she has gained from the course of instruction. The achievement test in science is used basically to test the cognitive domain of the student and to evaluate and analyze the learner cognition on some specific topic that has been transacted to the student. The achievement test which is used to understand the cognitive domain of the students can be constructed using the principles put forward by the famous educationist Bloom (1956) and his associates. There are several methods of testing the cognitive domain of the students but the widely accepted and most preferred one is by Bloom. The revised version of Bloom's taxonomy (2001) is used to construct the achievement test.

Scientific attitude is the most important outcomes of science learning and science teaching. It can be just a mind set in a particular direction or it can be a way of life. The sole responsibility of developing the scientific attitudes among the students lies on the teacher. Many teaching methods like play way method, co-curricular involvement, heuristic learning,

experiential learning gives effective exposure to the hidden curriculum which in turn play an important role in developing these scientific attitudes among the children.

Tribes of Kerala

There are 36 notified tribal communities in the State of Kerala, numbering 484,839. All the communities are entirely different in terms of culture, beliefs, livelihood strategies, social organisation, economy and total developmental perspectives. The notable tribal communities in Kerala include Paniya, Kurichchya, Kuruma, Kattunayakans, Uralies, Irulas of Muthuvans, Malayarayan and Kanikkar. There are 5 major tribal communities that are identified as primitive considering the stage of transition into modern society. They are named as Kattunaikans of Wayanad, Koragas of Kasargod, Cholanaickans of Nilambur Valley and Malappuram district, Kurumbars of Attapadi and Palakkad districts and Kadars of Cochin. There are 6771 families with the total population of 26273 consisting of 13073 males and 13200 females. Thus the family size is 3.88 registering the sex ratio among them as 1000:1010.

'Kadars': Kadar population is distributed in Palakkad and Thrissur districts of Kerala. Kadar speaks a no script language that inherits traits of Tamil language and Malayalam language. They depend mainly on non timber forest produce collection and the forest labour. They are expert food gatherers, hunters and trappers.

'Kattunayakans': Kattunayakans are distributed in Wayanad, Kozhikode, Malappuram and Palakkad districts. They speak a language similar to 'Kannada' but a no script language. They are considered as the lord of forests and they are mainly hunters, mahouts and sporadic cultivators. They are the community with the largest population among PVTG in Kerala.

'Koragas': Koragas are distributed only in Kasargode district of Kerala and in the adjoining state of Karnataka. They speak Tulu language. They are experts in weaving and basketry. They collect raw materials like bamboos, canes and creepers available from the forests.

'Kuruumbars': Kurumbars are distributed in Attapady Block Panchayat of Palakkad district. They also have a no script language called as Kurumba bhasha which is again a mixture of Tamil and Malayalam. They are excellent farmers and they cultivate cereals like 'Ragi' and 'Chama'.

'Cholanaickans': Cholanaickans are found only in the evergreen forests of Western Ghats in the Nilambur valley of Malappuram district in Kerala. They are the only community among PVTG who depend mainly on forest produces for their living and livelihood.

NEED AND SCOPE OF THE STUDY

Literacy rate of the scheduled tribes in the state is 74.44 percent, which is much lower than the state average literacy of 93.91 percent (2011). The literacy rate of the Scheduled tribes in Palakkad is reported as 57.63 percent and is the lowest among all the other districts in the state.

Particularly vulnerable tribal group (PVTG) (earlier: Primitive tribal group) is a Government of India classification created with the purpose of enabling improvement in the conditions of certain communities with particularly low development indices.

The Dhebar Commission (1960-1961) stated that within Scheduled Tribes there existed an inequality in the rate of development. During the fourth Five Year Plan a sub-category was created within Scheduled Tribes to identify groups that are considered to be at a lower level of development. This was created based on the Dhebar Commission report and other studies. This sub-category was named "Primitive tribal group". The features of such a group include a pre-agricultural system of existence that is practice of hunting and gathering, zero or negative population growth, extremely low level of literacy in comparison with other tribal groups.

Literacy rate of the Cholanaickan tribe, a community in PVTG, is 39.63 percent which is the lowest among the Scheduled tribe communities. The literacy rate of the other communities in PVTG, except the Koraga (78.35%) is very far below the state average. It is 56.36 per cent for Kurumbar, 58.74 per cent for Kadar and 59.37 per cent for Kattunayakan.

The literacy rate among the Scheduled Tribes (STs) in Kerala is only 74.44 percent as against 90 percent among the general population. This variance in literacy and level of education between the STs and the general population is continuing despite the increase in many number of educational support programmes that are made available to them.

The two notable causes for such an alarming situation can be numbered and pointed out as

a. Low enrolment ratio and
b. High dropout ratio of ST children in educational institutions as compared to general students and even SC students.

The culture specific tools like nature study, nature rambling, dramas and theatres finds suitable plug points within the curriculum to understand the importance of these developments as per the demands and the needs of the local society and its culture. The developments are significant only when it can make a progressive change in the society. The actual culture of the society must be reflected in learning about all the developments

happening in the society. What the society needs must be thus addressed through a culturally relevant instruction.

It is essential to develop and enhance the teaching learning strategy of the 21st century. The teachers should develop in them inter cultural understanding to effectively teach culturally diverse group of students. In order to infuse in the culture specific tools proper plug points inside the curriculum must be identified. The present research study is developed to frame an appropriate pedagogy to the PVTG tribal children in Kerala, particularly Attapadi and the Nilambur blocks and this tries to enhance the student interest towards the subject Science through a special experience based pedagogy. It has been reviewed that the tribal children especially the PVTG tribal group are having very low literacy level, low enrolment ratios and higher dropout rates when compared with other tribal students or students of other communities. Hence it is the need of the hour to increase the educational opportunities of the tribal children and to develop a suitable pedagogy that can foster them to learn further. The present study aim to develop a suitable instructional pedagogy so as to ensure interest in the subject they learn.

Instruction must be in such a manner that the curriculum must be taught in line with the local and culturally relevant contexts. Proper experiences must be made available to the children so that they can make their learning permanent. Hence the academic achievement and the interest to pursue studies are automatically generated in them.

The study tries to examine the educational attainment in the science subject and the student attitude in the school science as a subject of study. Considering the lower levels of literacy among the scheduled tribes and particularly the PVTG tribal groups, the study tries to explore the possibility of an experience based instruction for enhancing the achievement and attitude levels of the tribal children. The study follows the experience based instruction as suggested by Kolb in his experiential learning (1984). The study is conducted on the PVTG tribal group children studying in Class VIII in Asram schools of Kerala. It is found out from the detailed review of the scheduled tribes, that the PVTG tribal group is considered as most primitive and far below in their literacy levels on comparison with other tribal group who don't belong to the PVTG tribal groups. Hence the scope of the present study is to examine the effectiveness of experiential pedagogical instruction in enhancing the achievement in science, scientific attitude and the science process skills of the PVTG tribal children who are studying in Class VIII in Asram schools of Kerala. The locality of the study is selected as Malampuzha and Nilambur taluks of Palakkad and Malappuram districts in Kerala respectively. The area

were purposively selected by the researcher since the literacy rate of these four PVTG tribal groups namely the *'Kadars', 'Kurumbars', 'Cholanaickans' and 'Kattunayakans'* are far below than the other PVTG tribal group named *'Koragas'* who belong to the Kasargode district of Kerala. The lowest literacy rate among the PVG tribal group is reviewed and found out to be the 'Cholanaickan' community of Nilambur valley in Malappuram district of Kerala. Also the students of Class VIII are purposively selected since the major drop out cases is observed in the secondary classes than the primary and the senior secondary classes. The study is again limited to the subject Basic Science as the students are mainly selecting the humanities and the commerce groups after their secondary school exams. The science subject is very rarely selected by the PVTG group students and as it was reviewed that no PVTG group students were seen to pursue medical or engineering or any other science degree courses during their higher education.

The study tries to examine the educational status of the socially deprived children and a community whose educational standards are far below the state average. It has been reviewed that the tribal literacy rate is 74.44 percent and this is far below the state literacy of 93 percent. Comparing the educational status of the other communities it has been reviewed that the tribal population is far below in attainment of educational progress and higher education. The study was conducted among the PVTG tribal group in order to ensure educational progress and advancement among the lowest groups in terms of social progress, development and educational status.

The scope of the study is again limited to three dependent variables namely, science process skills, achievement in science and scientific attitude of the secondary school tribal students as science and its conceptual form is deeply related with the product and the process forms. Science process skills and the Achievement in Science satisfies both these forms and the basis for framing both these aspects lies in the scientific attitude of the student which serves as the most important aspect of science teaching and learning. The study is thus stated as;

'Effectiveness of Experiential Pedagogy on Science Process Skills, Scientific Attitude and Achievement in Science of Secondary School Tribal Students in Kerala'

STATEMENT OF THE PROBLEM

The study is aimed to enhance the achievement levels in the subject science, science process skills and the scientific attitude levels of the secondary school PVTG tribal group students

studying in Asram schools of Kerala through a specially designed experience based instruction as suggested by Kolb in Experiential Learning (1984).

Hence the problem can be stated as;

'EFFECTIVENESS OF EXPERIENTIAL PEDAGOGY ON SCIENCE PROCESS SKILLS, SCIENTIFIC ATTITUDE AND ACHIEVEMENT IN SCIENCE OF SECONDARY SCHOOL TRIBAL STUDENTS IN KERALA'

DEFINITION OF THE KEY TERMS

Experiential Pedagogy

Experiential pedagogy is operationally defined as a culturally relevant or responsive teaching where in each student is helped by the culturally competent teachers to relate the course content to his or her cultural context. Such an instruction is a form of pedagogy effectively suited to all children from different racial and ethnic backgrounds. By making education culturally relevant, it is thought to enhance the academic achievement and hence the self sustenance and social awareness of the students. The term is operationally defined as the practice of teaching and learning where the children learn the basic concepts and the fundamentals of what they learn through their first hand experience with the society. The term is taken from the underlying principles of experiential pedagogy as propounded by the world renowned educationist Kolb (1984). The four cycle stages of experiential pedagogy namely Concrete Experience, Reflective Observation, Active Experimentation and the Abstract Conceptualization are the basis of the concept used in the study.

Science Process Skills

The science process skills are operationally defined as those skills that are to be masterd for the effectve learning of the subject science. It is needed in the process of learning science. In the present study, the researcher has selected the science process skills according to the Longfield's Classification (2002). The selected science process skills for the study include, observing, comparing, classifying, measuring and making models. These are the skills that are to be developed in the students for understaning the basic concepts of science and for appreciating all scientific advancements.

Scientific Attitude

Scientific attitude can be defined as the open mindedness, truthfulness, a desire for accurate knowledge, confidence in the procedures for seeking knowledge, the expectation that the

solution of the problem will come through the use of a verified knowledge, eagerness to know about scentific advancments and free from superstitious belief.

Achievement in Science

The present study uses the Bloom's revised taxonomy to construct the achievement test for the modules taught in the process. It measures how much a student has achieved the concepts that were transacted during the instruction. It gives weightage to objectives, content, forms of questions and the difficulty levels. It also helps to place the students according to their ranks obtained in the test, based on their performance.

Achievement in Science is operationally defined as the cognitive achievement the students have made after the completion of the experiential pedagogical module. The achievement in science is measured using an achievement test constructed according to the Bloom's Revised Taxonomy (2001).

Secondary School Tribal Students

The secondary school tribal students include the students belonging to the age group of 12 to 14 and studying in class 8. The students are selected from two different Asram schools located in Malappuram and Palakkad districts of Kerala.

The tribal students belong to the four tribal sections in the PVTG group. The secondary school tribal students selected for the study belong to the Kadars, Kurumbars, Kattunayakans and Cholanaickans tribes of the PVTG group in Kerala.

IDENTIFICATION OF THE VARIABLES

- Testing variable- Achievement in Science, Scientific attitude, Science process skills
- Experimental variable- Experiential Pedagogy

OBJECTIVES OF THE STUDY

1. To find out the level of achievement in science and scientific attitude of the secondary school tribal students of class 8.

2. To construct a module in experiential pedagogy in science at secondary school level for the tribal students.

3. To determine the effect of experiential pedagogy on the achievement in science, scientific attitude and the science process skills of the secondary school tribal students

4. To find out if there exists any significant difference in the post test and the delayed post test in achievement in science, scientific attitude and the science process skills in secondary school tribal students.

5. To determine the relationship between achievement in science, science process skills and the scientific attitude among secondary school tribal students

6. To classify the different types of learners according to Kolb's Experiential Learning Style and to find out the significant difference in the effectiveness of Experiential Learning module on their achievement in science, science process skills and scientific attitude of the secondary school tribal students based on their learning style.

HYPOTHESES FORMULATED FOR THE STUDY

1. There exists no distinct different level of achievement in science and scientific attitude among secondary school tribal students of class 8.

2. Experiential pedagogy has no significant effect in increasing the achievement in science, scientific attitude and the science process skills of the secondary school tribal students.

3. There exists no significant difference in the post test and the delayed post-test in achievement in science, scientific attitude and the science process skills in secondary school tribal students.

4. There exists no correlation between the achievement in science, science process skills and the scientific attitude of secondary school tribal students.

5. There exists no difference in the types of learners according to Kolb's Experiential learning Style

6. There exists no significant difference in achievement in science, science process skills and scientific attitude of secondary school tribal students based on their learning style

LIMITATIONS OF THE STUDY

- The study is limited to only 5 basic science process skills, observing, comparing, classifying, measuring and making models.
- The study is limited to two selected chapters of Physics in Basic Science textbook of Class VIII prescribed by State Council of Educational Research and Training (SCERT)
- The study is limited to a particular type of instruction, experiential learning

DELI MITATIONS OF THE STUDY

- The study is delimited to particular tribal group called PVTG (Particularly Vulnerable Tribal Group) which is considered as the primitive tribal group taking into consideration their stage of transition in to modern society.
- The study is delimited to two tribal Asram high school students of class 8 who live in Palakkad and Malappuram districts of Kerala.

REVIEW OF RELATED LITERATURE

NEP 2020 has envisioned that curriculum content must be reduced to enhance essential learning and critical thinking. The recommendations also focus on the adoption of experiential learning in all stages. This is to include hands-on-learning as standard pedagogy within each subject, and with explorations of relations among different subjects. To close the gap in achievement of learning outcomes, classroom transactions will shift towards competency-based learning and education. The assessment tools also need to be aligned with the learning outcomes, capabilities and dispositions as specified for each subject of a given class.

Ongowo and Indoshi (2014) conducted a study to determine the Science Process Skills included in the Kenya Certificate of Secondary Education (KCSE) biology practical examinations in Kenya for a period of 10 years (2002- 2012). Ex-post facto design was adopted for the study. The study identified five most common Science Process Skills which were observation (32.24%), communication (14.63%), inference (13.13%), experimentation (12.21%) and interpretation of data (11.94%). The results also revealed a high percentage of basic Science Process Skills at 73.73% compared to the integrated Science Process Skills at 26.27%. It was recommended that the Kenya National Examination Council should include more integrated Science Process Skills into the KCSE biology practical examinations to

enable the students to develop problem solving abilities and creativity which are important tools for bio-technology.

Olasehinde and Olatoye, (2014) conducted a study on scientific attitude, attitude towards science and science achievement of senior secondary school students in Katsina state, Nigeria and concluded that scientific attitude did not significantly predict science achievement. They also revealed that the scientific attitude had positive but no significant relationship with science achievement.

Yakar (2014) investigated the effectiveness of a University Primary Science Teacher Education Programme on Science Process Skills of pre-service science teachers. The programme comprised of several activities facilitating the development of Science Process Skills. Major findings indicated that the University- Science Teacher Education Programme was helpful in developing pre-service science teachers' Science Process Skills effectively.

Mukhopadhyay, (2013) investigated whether aptitude in Physics, scientific attitude and deep approach can explain achievement in Physics significantly. He found that the scientific attitude and academic achievement was associated positively.

Beard (2010) developed an experiential learning tool kit that offers techniques which help the learners to make sense of their experiences, as well as method to develop and practise new behaviours. The techniques include mood setting, drama, creative writing, art, meditation, environmental modification and routine rituals. The practical experiences include help the coaches, developers, educators or trainers to focus on new ideas and to explore ways to improve the professional practice and ethical responsibility through self monitoring and the feedback techniques. The article includes many of the theories and practical methods that apply equally to providers and learners, indeed as practitioners, and such good practise emanates from the ability to learn from one's own experiences.

One of the most influential writers on the subject is David A Kolb who wrote Experiential learning in which he stressed the importance of experience and state that the foundation for education and learning as a lifelong process that is soundly based on intellectual traditions of social psychology, philosophy, and cognitive psychology. The experiential learning model pursues a framework for examining and strengthening the critical linkages among education, work and personal development. It offers a system of competencies for describing job demands and the corresponding educational objectives and emphasizes the critical linkages that can be developed between the classroom and the real world with the experiential learning

methods. It pictures the workplace as a learning environment that can enhance and supplement formal education and can foster personal development through meaningful work and career development opportunities. It stresses the role of formal education in lifelong learning and the development of individuals to their full potential as citizens, family members and human beings.

METHODOLOGY

The study followed a single group pre test post test design among the secondary school tribal students of Class VIII belonging to the PVTG tribal group and studying in Asram schools of Kerala. Since the study is involving a minority group and that the study involves a deeper knowledge of the group to be studied, the study demand a precise knowledge of the PVTG group. Hence it is possible only if the group is taken as a whole and thus single group design is the best possible design that can be adopted for the study. The two Asram schools were also selected purposely since the dropout rates of the PVTG children are higher in these districts of Kerala when compared with other districts of the state. Then the experimental treatment is given to the Class VIII students as a whole. The students are first given a pre test to assess their existing standards and then after administering the experimental treatment, a post test is administered to find out the effect of the experiment on the science achievement, scientific attitude and science process skills of the Class VIII PVTG children. After a time span of two weeks, a delayed post test was also done to check the memory retention of the students.

Tools developed for the study:-Three tools were developed by the researcher for measuring the achievement in science, science process skills and the scientific attitude levels of the students. Two focus group interview schedules were prepared for teachers and students about the opinion on the instructional package developed. A previous knowledge test in science was developed in order to test the previous knowledge of the selected sample. An instructional package called as Experiential Learning Package in Sound and Static Electricity (ELPSS) was developed by the researcher to administer the experiential learning among the chosen sample. Kolb’s learning style inventory-KLSI Version 3.1 published in the year 2005 was adapted according to the Indian standards and also used in the study to understand the different types of learning styles in the chosen sample.

DATA ANALYSIS

The following statistical techniques are to be used for analyzing the data. To test the data,

1. measures of central tendency
2. percentage analysis
3. test of significance (t-test)
4. Correlation analysis- Pearson's product moment correlation (r) and
5. ANOVA is to be used

MAJOR CONCLUSIONS

1. There exist distinct different levels of achievement in science and scientific attitude among secondary school tribal students of Class 8. After the administration of the module in Malampuzha Asram School, post tests has been conducted in the sample and the results were recorded which was found to be categorised under three groups as well. The results recorded were categorised into groups where the low group had no change but the average group number reduced from 28 to 27 and the high group increased from 6 to 7. The interpretation can be thus recorded that there exists three different groups as high, average and low which corresponds to a data that is equivalent to a normal distribution sample. In the Nilambur Asram School, the scores has been categorised into different levels viz; high, average and low. The table values of pre test scores has been categorised in a group of 7 students in high, 27 students in average and 6 students in low group. After the administration of the module, post test has been conducted which is also categorised in to three different groups as, 7 in the high group, 27 in the average group and 6 in the low group. It has been recorded that the data corresponds to a sample population wherein majority of the students fall under average group.
2. Experiential pedagogy has a significant effect in increasing the achievement in science, scientific attitude and the science process skills of the secondary school tribal students studying in Class 8. In the Malampuzha Asram School, the obtained t-value is 80.240, 18.537, 22.074 respectively which is higher than the tabled t-value which suggests that the result is highly significant at 0.05 level of significance and in the Nilambur Asram School, the obtained t-value is 56.629, 32.004, 25.374 respectively which is higher than the tabled t-value which suggests that the result is highly significant at 0.05 level of significance.
3. There exists significant difference in the post test and the delayed post test in achievement in science, scientific attitude and science process skills of the secondary

school tribal students studying in Class 8. The obtained t-values in the Malampuzha Asram School for the dependent variables are 13.549, 15.004, and 7.517 which is higher than the tabled t-value which suggests that the result is significant at 0.05 level of significance. The obtained t-value in the Nilambur Asram School for the dependent variables are 10.491, 9.760, 5.088 which is higher than the tabled t-value which suggests that the result is significant at 0.05 level of significance.

4. There exists a positive correlation between the achievement in science, scientific attitude and science process skills of secondary school tribal school students studying in Class 8. From the obtained value of *r* (0.987), it can be inferred that there exists a significant positive linear relationship between academic achievement and attitude of the students of Malampuzha Asram School, Palakkad. The value of obtained *r* also denotes a high relationship between the two variables. From the obtained value of *r* (0.958), it can be inferred that there exists a significant positive linear relationship between academic achievement and attitude of the students of Nilambur IGMMR Asram School, Malappuram. The value of obtained *r* also denotes a high relationship between the two variables.
5. There exists a difference in the types of learners among the secondary school tribal students studying in Class 8, according to Kolb's learning style. The administration of the Kolb's Learning Style Inventory in the Malampuzha Asram School finds that out of the total sample of 40, 13 of them fall under accommodating group, 20 fall under diverging group, 3 under converging group and 4 under assimilating group. The Kolb's Learning Style Inventory in the Nilambur Asram School finds that out of the total sample of 40, 10 of them fall under accommodating group, 19 fall under diverging group, 5 under converging group and 6 under assimilating group.
6. There exists no significant difference in achievement in science, science process skills and scientific attitude of the secondary school tribal students based on their learning styles. Thus the experiential learning module is equally suited to all the learners irrespective of their learning style patterns. The calculated value of F (3, 36) of each of the mean scores of achievement in science, scientific attitude and science process skills is lesser than the tabled value at 0.05 level of significance. It means that there exists no significant difference in the mean scores of achievement in science, science process skills and scientific attitude of the secondary school tribal student studying in Class 8 of Asram School Malampuzha based on their respective learning styles. The calculated value of F (3, 36) of each of the mean scores of achievement in science, scientific

attitude and science process skills is lesser than the tabled value at 0.05 level of significance. It means that there exists no significant difference in the mean scores of achievement in science, science process skills and scientific attitude of the secondary school tribal students studying in Class 8 of IGMMR Asram School Nilambur, based on their respective learning styles.

EDUCATIONAL IMPLICATIONS OF THE STUDY

The study is based on experience based instruction as suggested by David S Kolb. It follows the experiential pedagogy to instil in curiosity and scientific attitude among the chosen sample. The study elaborately studies the achievement progress made by a student who is following the experiential learning system. This will help the educationists to analyze the cognitive level progress made by the students through the administration of the chosen methodology. The study also helps to develop and enhance the basic science process skills and the scientific attitude of the students which are very important aspects of science teaching and learning. The findings of the study will be thus helpful in enhancing the student attitude towards the teaching learning process. The methodology that has been followed in the study can help the future researchers and the educationists to choose an appropriate teaching methodology or an apt instructional method so as to arouse interest and curiosity among a culturally deprived population.

Hence it is high time that all of us educationists, entrepreneurs and social organizations join hands with the government to enhance the educational status of the tribal children and help them understand the importance of education and employment opportunities. Along with the scientific advancements, this point too needs to be focussed that the country can develop only if the people living within the country are literate, employed and well sustained by themselves. Ample opportunities must be provided by the teachers themselves so that the education becomes an enjoyable process to the tribal children.

RECOMMENDATIONS OF THE STUDY

The study has explored the educational status of the four major PVTG tribal groups namely, ‘Kurumbars’, ‘Kadars’, ‘Kattunayakans’ and ‘Cholanaickans’. The experiential learning has played a significant change in their achievement levels in the subject of study and has played a great role in enhancing the scientific attitude of the tribal students. Since the students belong to a community that is deeply deprived both culturally and economically, the study has made a considerable attempt in simplifying the educational objectives by choosing relevant learning experiences from their culture and local knowledge. The study puts forward

a major recommendation that the educational instruction be changed to a suitable pedagogy like experiential learning that can bring an enjoyable learning experience to such a minority sample. The educational ostracism which is else prevalent among this social group can be widely narrowed down if such an appropriate instructional method of teaching learning is practiced in schools.

SUGGESTIONS FOR FURTHER RESEARCH

The study so far has attempted to enhance the student attitude towards science as a school subject. It is to be noted that the secondary school comprise of basic subjects that are essentially and inevitably needed for the lifelong learning of the child. It is important that the children get a basic knowledge of all the subjects at the end of their secondary school. So it can be a topic of research to examine the implementation and practice of experiential teaching learning practices in all the basic subjects of secondary school.

The study tries to examine the 4 major PVTG tribal groups who are very much backward in their literacy and educational status. Other tribes can also be selected for further research and studies so that the educational status of all the notable tribes in Kerala state can also benefit from such a novel experience based learning platform.

The study can be adapted to other subjects as well to imbibe in the principles of experiential learning to all the subjects of study at the secondary level. The study is well in tune with the principles of work based education as suggested by Mahatma Gandhi, our honourable Father of Nation and so the principle can be adapted in all learning and training methodologies for self sustainable education.

CONCLUSION

The study entitled the 'Effectiveness of Experiential Pedagogy on Science Process Skills, Scientific Attitude and Achievement in Science of Secondary School Tribal Students in Kerala' has significant impact in enhancing the achievement levels, scientific attitude levels and the science process skills of the student with the help of an enjoyable learning experience provided to them by experiential learning module. Along with the 21st century skills it is needed that the children get ample opportunities to grow and learn. They must experience what they learn. They must be capable of solving practical problems through logic ad reasoning skills. Experiential pedagogy progresses through a learning cycle in which the learner finds himself in different stages of learning while a new learning is being acquired by him. A logical sequence follows behind each learning stage and when the learner unveils the sequence of logic by himself and a permanent learning happens in him. The learning hence

becomes a cake walk for the learner as they become burden free from rote learning and memorising.

Experiential learning can be adopted in all the schools and colleges irrespective of their age group and maturity level because the pedagogy progresses forward through the learner progress and convenience. It can initiate self learning and self sustainability among the learners and can set a beautiful stage for burden free hassle free learning experience.

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